AMSAT News Service Weekly Bulletins
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SB ALL @ AMSAT $ANS-188.01
MICROSAT STATUS REPORT, PT I

HR AMSAT NEWS SERVICE BULLETIN 188.01 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

NK6K Provides MICROSAT Bulletin Board System (BBS) Status Report

Harold Price (NK6K) this week has provided the AMSAT News Service (ANS) with a complete run down on the MICROSAT Bulletin Board System (BBS) software (S/W) development effort. Working in close collaboration with Harold is Jeff Ward (K8KA) at the University of Surry (UoS) on the UO-14 BBS S/W. The following is a brief synopsis of the current progress.

It was decided early on to use UO-14 as a testbed for all MICROSAT BBS development. NK6K points out that there are several advantages to this. First off, all S/W developed for UO-14 is completely portable to the MICROSATs due to a device programmers call high-level Application Programming Interfaces (API). The APIs hide the differences between the different computer architecture of the MICROSATs and UO-14. The APIs perform the "nitty-gritty" tasks that are peculiar to the hardware of a particular computer system. For example, one of the most common task performed by all computer systems is Input/Output (I/O) operations. Thus, to the programmer it makes little difference if the BBS S/W he is writing is for the MICROSATs or for the Packet Communication Experiment (PCE) on UO-14, as long as he uses the APIs.

Another advantage for using UO-14 as a testbed is the 9600 baud uplink/downlink that it uses. NK6K says that he can load new S/W in two passes as compared to eight passes for the MICROSATs. The MICROSATs use the much slower but more common 1200 baud. Also, UO-14 has a completely separate computer system for the PCE operations. The UO-14 On-board Computer (OBC) which controls the satellite is unaffected by what happens with the secondary PCE computer. So if the BBS S/W crashes, UO-14 will continue to operate normally. If the BBS S/W causes a crash of the OBC on a MICROSAT, a great deal of S/W needs to be reloaded. Although an OBC crash doesn't put a MICROSAT at great risk, it is inconvenient to the users. Except for DOVE, most S/W reloads of a MICROSAT OBC are not very difficult to accomplish.
/EX
SB ALL @ AMSAT $ANS-188.02
MICROSAT STATUS, PT II

HR AMSAT NEWS SERVICE BULLETIN 188.02 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

MICROSAT Status, Part II

Lets go down the list of MICROSATs and give the present status for each one.

AO-16

AO-16 is in good shape. RAM memory tests will be done this week in preparation for uploading the BBS S/W. According to NK6K, at the present time, the BBS S/W for AO-16 is targeted to be installed and operational by August. Until that time digipeating operation will be possible.

DO-17

DOVE is still transmitting on S-Band only. Full recovery has been delayed due to an unexplained anomaly in the S-Band transmitter. N4HY has to rely on the S-Band transmitter because the 2M transmitter blocks the 2M receiver on DOVE. This anomaly has required N4HY to use his considerable programming skills to write special Digital Signal Processing (DSP) S/W to work around this problem. Another problem plaguing the DOVE recovery is that N4HY's hastily assembled S-band station is about 5 dB SNR lower than what is required for reliable reception. N4HY has, however, been able to use the high quality S-Band station of K0RZ in Boulder, Colorado via phone patch during mutually visible passes for software loading. N4HY has given the DOVE recovery top priority. At press time (Saturday July 7), DOVE had again crashed as evidenced by MBL transmissions from the S-Band beacon. Analysis was under way to determine whether the crash was due to a problem in one of the tricky software upload sessions or, less likely, another hardware problem. Two meter transmissions were not expected before Tuesday July 10.
/EX
SB ALL @ AMSAT $ANS-188.03
MICROSAT STATUS, PART III

HR AMSAT NEWS SERVICE BULLETIN 188.03 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

MICROSAT Status, Part III

WO-18

WO-18 is in good shape. The third version of the imaging S/W was uploaded last week. The Weber State University (WSU) engineers have added more "tuning knobs" to the picture taking S/W in order to improve the contrast of the earth images. Additional information has been added to the image header giving the solar array currents and horizon sensor values when the picture was snapped. These added items will provide more information about where the lens was pointed when the picture was taken. The impact detector, which was originally designed to indicate when WO-18 was hit by micrometeorites, is being used to verify that the CCD camera iris shutter has clicked. When the shutter is snapped, the impact detector instantaneously sees the vibration that the shutter operations cause in the spacecraft structure.

Each day several images have been downloaded and those who have WeberWare 1.0 can turn the binary data into pictures on CRT screens. Finally, the 1.2 GHz Fast Scan TV receiver was tested and the horizontal sync was detected. A full image is expected to require more gain and/or much more accurate antenna pointing.

One good quality picture of earth features has finally been taken and will be transmitted every evening for the next several days so that WeberWare 1.0 users will be sure to have a chance to capture it. Other testing will continue during each day.

LO-19

LO-19 is in good shape. The RF power output of LO-19 is though to have been varying because of the simultaneous operation of the CW beacon. Once the RAM memory checking S/W has been finished and checked out on AO-16, the same RAM memory check will be performed on LO-19. Eventually the AMSAT-LU Group will take over all the S/W development for LO-19 after the BBS S/W is installed.

At the present time all general housekeeping and monitoring tasks are performed by the AMSAT-LU team.
/EX
SB ALL @ AMSAT $ANS-188.04

DOVE RECOVERY EFFORT INTENSE

HR AMSAT NEWS SERVICE BULLETIN 188.04 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

N4HY Tries The "Auditory" Method For Loading DOVE Software

This past weekend, N4HY was connected through a phone patch to the QTH of Bill McCaa (K0RZ) in order to take advantage of Bill's S-band station in an intense effort to bring DOVE back to life on two meters. In what amounts to an all-time packet radio first, N4HY will listen by ear for the Acknowledge packets to decide if he needs to resend each 128 byte packet. K0RZ provides the downlink station and N4HY uses his own 2M station to uplink S/W to DOVE. N4HY is using his own special bootloader to load 50,000 bytes of S/W instead of the resident ROM based MICROSAT Bootloader (MBL). This new DOVE bootloader will only send an ACK when it receives a good packet stream, but will never send NACKs. If N4HY therefore does not hear an ACK for a particular uplinked packet, he assumes that the packet wasn't received by DOVE and he manually sends it again. So far this "auditory" packet S/W loading technique has worked well.

Although many might view this as a futile effort, N4HY has chided himself for not thinking of this technique several months ago. As N4HY puts it: "WHAT A HACK, but no reason it shouldn't work!" The primary ingredient to making this happen, however, is the outstanding S-band station of K0RZ.

Stay tuned to AMSAT Nets and ANS bulletins for further updates on the recovery of DOVE-OSCAR-17.
/EX
SB ALL @ AMSAT $ANS-188.05
AMSAT-DL STMNT ON AO13 ORBIT

HR AMSAT NEWS SERVICE BULLETIN 188.05 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

The following statement has been received from Dr. Karl Meinzer (DJ4ZC), President of AMSAT-DL:

"Recently some information has been circulated stipulating the decay of the AO-13 orbit between 1992 and 1997.

"Elliptic orbits with high inclination (like AO-13) are potentially unstable due to luni-solar perturbations. This has been known for a long time and in fact some Molnija-satellites have prematurely decayed from this mechanism. AMSAT was aware of this problem and had a study performed by a NASA expert in the late nineteen seventies for the P3 programme. The conclusion of the study was, that the perigee height can oscillate with an amplitude of +-1000 km. As a consequence the minimum perigee height for the P3-satellites was chosen to be 1500 km. On AO-13, 2500 km was chosen for additional margin against decay.

Recently, the problem of orbit stability was revisited by Victor Kudielka, OE1VKW (AMSAT-DL Journal 2, 90, pp. 5-7). OE1VKW discovered that the perturbations can have a longer "time-constant" and thus result in much larger effects than previously believed. In particular he predicted a possible decay of AO-13 for early 1997. At this time we do not understand the discrepancy between the old study and OE1VKW's results. Since OE1VKW's results so far are in good agreement with the actual orbit of AO-13, there is little doubt that his computations are basically correct. So the conclusion is inevitable that the old study was either too coarse or that the change of the lunar orbit (18.6 years nutation period, 8.6 years period of perigee rotation) has invalidated the original study.
/EX

SB ALL @ AMSAT $ANS-188.06
AMSAT-DL STATEMENT, PART 2

HR AMSAT NEWS SERVICE BULLETIN 188.06 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

The publication of OE1VKW's work triggered a flurry of activity in the USA. In particular Bob McGwier, N4HY, used a NORAD tracking program and found that a decay may happen as early as 1992. Bob states that he used the program as a black box without having user instructions. Unfortunately, the orbit situation is such that some very slight parameter changes have a dramatic influence on the lifetime. Also, numerical integration programmes have many potential pitfalls. So at this time, we can only conclude that the perigee height of AO-13 is coming down and this could lead to the loss of AO-13 during the nineties.

Also, at this time it is unclear in what direction the orbit will be influenced by the onset of air drag. It could either make the orbit more stable or accelerate the decay. Also it will be worthwhile to investigate if we have any means to prolong the life of AO-13 by exploiting the on-board systems.

With the orbit of AO-13, we apparently were very lucky and very unlucky at the same time. We were lucky in that we used to our propulsion excess to increase the perigee height over the original figure just to "buy margin" without a strong reason. But we were also unlucky because the present studies were not available in 1988. It would have been easy to either wait after the first motor-burn for a sufficient RAAN-change before the final burn thus eliminating the problem or to increase the perigee height even further. Certainly we will not be so blue-eyed with P3-D.

Of course, AMSAT-DL will make every effort to keep AO-13 in operation as long as possible. We hope that we can keep AO-13 until P3-D is launched to give us continuity of operation.
/EX
SB ALL @ AMSAT $ANS-188.07
OPERATIONS NET SCHEDULE

HR AMSAT NEWS SERVICE BULLETIN 188.07 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

AMSAT-NA Operations Net Schedule Announced

AMSAT Operations Nets are planned for the following times. Mode B nets are conducted on an AO-13 downlink frequency of 145.950. Mode J/L nets are conducted on an AO-13 downlink frequency of 435.970.

Date UTC	Time	Phs	Mode	NCS	U.S. Day
09 Jul 90	0000	184	B	N5BF	Sunday
16 Jul 90	0115	130	B	N5BF	Sunday
27 Jul 90	0030	130	B	N5BF	Thursday

For information on the amateur satellite program and how you can participate, contact AMSAT-NA at P.O. Box 27, Washington, DC 20044, phone (301) 589-6062, or contact your nearby AMSAT Regional Coordinator
/EX
SB ALL @ AMSAT $ANS-188.08
NEW AO-13 TRANSPONDER SCHED

HR AMSAT NEWS SERVICE BULLETIN 188.08 FROM AMSAT HQ
SILVER SPRING, MD JULY 7, 1990
TO ALL RADIO AMATEURS BT

A new Transponder Schedule for AO-13 was put into effect on July 3.

The present transponder schedule for AO-13 is as follows:

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         Mode-B          : MA 003 to MA 165
         Mode-JL         : MA 165 to MA 190
         Mode-LS         : MA 190 to MA 195  (Mode S Beacon only)
         Mode-S          : MA 195 to MA 200
         Mode-BS         : MA 200 to MA 205
         Mode-B          : MA 205 to MA 240
         Off             : MA 240 to MA 003
         Omnis           : MA 240 to MA 060
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Cross mode B and S QSOs are possible from MA 200 to 205.

The current attitude estimate:

BLON = 207 and BLAT = +1

AMSAT-OSCAR-10 appears to be receiving sufficient solar panel illumination to support Mode-B transponder operations, therefore, the transponder is available for general use whenever AO-10 is in view at your location. Please DO NOT use the transponder if the signals are FMing. The current estimate of AO-10's attitude is LON 24 deg LAT -9 deg.

Much activity has been heard on AO-10 centering around a popular calling frequency of 145.910 MHz.
/EX
SB ALL @ AMSAT $ORBS-188.O
Orbital Elements 188.OSCAR

HR AMSAT ORBITAL ELEMENTS FOR OSCAR SATELLITES
FROM N3FKV LORENA, TX JULY 7, 1990
TO ALL RADIO AMATEURS BT

```
Satellite: AO-10
Catalog number: 14129
Epoch time:      90177.47365881
Element set:     530
Inclination:       26.0107 deg
RA of node:       197.5005 deg
Eccentricity:    0.5961085
Arg of perigee:   154.3991 deg
Mean anomaly:     254.3150 deg
Mean motion:    2.05881318 rev/day
Decay rate:      -4.10e-07 rev/day^2
Epoch rev:            5292

Satellite: UO-11
Catalog number: 14781
Epoch time:      90182.63053424
Element set:     754
Inclination:       97.9480 deg
RA of node:       234.7134 deg
Eccentricity:    0.0012006
Arg of perigee:   197.5080 deg
Mean anomaly:     162.5709 deg
Mean motion:   14.65457881 rev/day
Decay rate:       8.66e-06 rev/day^2
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Epoch rev:           33808

Satellite: RS-10/11
Catalog number: 18129
Epoch time:      90187.05410024
Element set:     245
Inclination:       82.9278 deg
RA of node:       314.5857 deg
Eccentricity:    0.0013227
Arg of perigee:    70.0511 deg
Mean anomaly:     290.2091 deg
Mean motion:   13.72097140 rev/day
Decay rate:       8.90e-07 rev/day^2
Epoch rev:           15203

Satellite: AO-13
Catalog number: 19216
Epoch time:      90184.94672410
Element set:     135
Inclination:       57.0113 deg
RA of node:       147.4281 deg
Eccentricity:    0.6982849
Arg of perigee:   230.6131 deg
Mean anomaly:      43.7356 deg
Mean motion:    2.09704960 rev/day
Decay rate:      -1.82e-06 rev/day^2
Epoch rev:            1575

Satellite: FO-20
Catalog number: 20480
Epoch time:      90185.08503568
Element set:      91
Inclination:       99.0369 deg
RA of node:       228.4026 deg
Eccentricity:    0.0541364
Arg of perigee:    10.3474 deg
Mean anomaly:     350.8266 deg
Mean motion:   12.83158679 rev/day
Decay rate:       7.30e-07 rev/day^2
Epoch rev:            1891
/EX
SB ALL @ AMSAT $ORBS-188.D
Orbital Elements 188.MICROS

HR AMSAT ORBITAL ELEMENTS FOR THE MICROSATS
FROM N3FKV LORENA, TX      JULY 7, 1990
TO ALL RADIO AMATEURS BT

Satellite: UO-14
Catalog number: 20437
Epoch time:      90185.19502530
Element set:     174
Inclination:       98.6973 deg
RA of node:       261.2539 deg
Eccentricity:    0.0012398
Arg of perigee:   104.9649 deg
Mean anomaly:     255.2960 deg
Mean motion:   14.28649049 rev/day
Decay rate:       2.70e-06 rev/day^2
Epoch rev:            2329

Satellite: AO-16
Catalog number: 20439
Epoch time:      90185.18358906
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Element set:      90
Inclination:       98.7037 deg
RA of node:       261.3512 deg
Eccentricity:    0.0012717
Arg of perigee:   103.2210 deg
Mean anomaly:     257.0400 deg
Mean motion:   14.28753136 rev/day
Decay rate:       2.41e-06 rev/day^2
Epoch rev:            2329

Satellite: DO-17
Catalog number: 20440
Epoch time:      90185.24914985
Element set:      94
Inclination:       98.7035 deg
RA of node:       261.4266 deg
Eccentricity:    0.0012939
Arg of perigee:   103.4420 deg
Mean anomaly:     256.8212 deg
Mean motion:   14.28799640 rev/day
Decay rate:       2.63e-06 rev/day^2
Epoch rev:            2330

Satellite: WO-18
Catalog number: 20441
Epoch time:      90185.23712146
Element set:      95
Inclination:       98.7034 deg
RA of node:       261.4353 deg
Eccentricity:    0.0013505
Arg of perigee:   104.5773 deg
Mean anomaly:     255.6912 deg
Mean motion:   14.28895732 rev/day
Decay rate:       2.43e-06 rev/day^2
Epoch rev:            2330

Satellite: LO-19
Catalog number: 20442
Epoch time:      90185.22932602
Element set:      94
Inclination:       98.7030 deg
RA of node:       261.4448 deg
Eccentricity:    0.0013820
Arg of perigee:   104.3065 deg
Mean anomaly:     255.9658 deg
Mean motion:   14.28964845 rev/day
Decay rate:       2.40e-06 rev/day^2
Epoch rev:            2330
/EX
SB ALL @ AMSAT $ORBS-188.M
Orbital Elements 188.MISC

HR AMSAT ORBITAL ELEMENTS FOR MANNED AND MISCELLANEOUS SATELLITES
FROM N3FKV LORENA, TX      JULY 7, 1990
TO ALL RADIO AMATEURS BT

Satellite: SALYUT 7
Catalog number: 13138
Epoch time:      90187.08643662
Element set:     364
Inclination:       51.5981 deg
RA of node:       208.4200 deg
Eccentricity:    0.0002108
Arg of perigee:    12.6384 deg
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Mean anomaly:     347.4903 deg
Mean motion:   15.65478058 rev/day
Decay rate:     5.3987e-04 rev/day^2
Epoch rev:           46781

Satellite: MIR
Catalog number: 16609
Epoch time:      90186.64239909
Element set:     775
Inclination:       51.6126 deg
RA of node:       237.6281 deg
Eccentricity:    0.0010676
Arg of perigee:   110.8773 deg
Mean anomaly:     249.3197 deg
Mean motion:   15.62524310 rev/day
Decay rate:     2.6365e-04 rev/day^2
Epoch rev:           25098

Satellite: HUBBLE
Catalog number: 20580
Epoch time:      90187.05941761
Element set:     116
Inclination:       28.4714 deg
RA of node:       129.5212 deg
Eccentricity:    0.0006826
Arg of perigee:   330.0571 deg
Mean anomaly:      29.9869 deg
Mean motion:   14.84546267 rev/day
Decay rate:      2.335e-05 rev/day^2
Epoch rev:            1078
/EX
SB ALL @ AMSAT $ORBS-188.W
Orbital Elements 188.WEATHER

HR AMSAT ORBITAL ELEMENTS FOR WEATHER SATELLITES
FROM N3FKV LORENA, TX      JULY 7, 1990
TO ALL RADIO AMATEURS BT

Satellite: NOAA-9
Catalog number: 15427
Epoch time:      90186.53953292
Element set:     601
Inclination:       99.1683 deg
RA of node:       186.7945 deg
Eccentricity:    0.0014629
Arg of perigee:   321.1521 deg
Mean anomaly:      38.8597 deg
Mean motion:   14.12611022 rev/day
Decay rate:       4.15e-06 rev/day^2
Epoch rev:           28657

Satellite: NOAA-10
Catalog number: 16969
Epoch time:      90183.38641875
Element set:     447
Inclination:       98.5974 deg
RA of node:       210.9907 deg
Eccentricity:    0.0012582
Arg of perigee:   223.1463 deg
Mean anomaly:     136.8731 deg
Mean motion:   14.23650603 rev/day
Decay rate:       3.22e-06 rev/day^2
Epoch rev:           19677
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Satellite: MET-2/16
Catalog number: 18312
Epoch time:      90185.32051146
Element set:     451
Inclination:       82.5544 deg
RA of node:       276.7110 deg
Eccentricity:    0.0011204
Arg of perigee:   200.8365 deg
Mean anomaly:     159.2339 deg
Mean motion:   13.83658545 rev/day
Decay rate:       2.19e-06 rev/day^2
Epoch rev:           14535

Satellite: MET-2/17
Catalog number: 18820
Epoch time:      90185.39849661
Element set:     309
Inclination:       82.5437 deg
RA of node:       336.7763 deg
Eccentricity:    0.0015421
Arg of perigee:   278.6447 deg
Mean anomaly:      81.2960 deg
Mean motion:   13.84349847 rev/day
Decay rate:       7.60e-07 rev/day^2
Epoch rev:           12256

Satellite: MET-3/2
Catalog number: 19336
Epoch time:      90185.28497008
Element set:     518
Inclination:       82.5423 deg
RA of node:       265.3282 deg
Eccentricity:    0.0016020
Arg of perigee:   273.2973 deg
Mean anomaly:      86.6111 deg
Mean motion:   13.16900567 rev/day
Decay rate:       3.91e-06 rev/day^2
Epoch rev:            9320

Satellite: NOAA-11
Catalog number: 19531
Epoch time:      90185.31988497
Element set:     301
Inclination:       98.9820 deg
RA of node:       133.6476 deg
Eccentricity:    0.0011255
Arg of perigee:   232.8678 deg
Mean anomaly:     127.1464 deg
Mean motion:   14.11640134 rev/day
Decay rate:       4.28e-06 rev/day^2
Epoch rev:            9138

Satellite: MET-2/18
Catalog number: 19851
Epoch time:      90185.15776685
Element set:     253
Inclination:       82.5206 deg
RA of node:       214.9347 deg
Eccentricity:    0.0013581
Arg of perigee:   324.3790 deg
Mean anomaly:      35.6458 deg
Mean motion:   13.83986438 rev/day
Decay rate:       1.05e-06 rev/day^2
Epoch rev:            6791
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Satellite: MET-3/3
Catalog number: 20305
Epoch time:      90185.09823028
Element set:     160
Inclination:       82.5533 deg
RA of node:       206.0657 deg
Eccentricity:    0.0014622
Arg of perigee:   291.1921 deg
Mean anomaly:      68.7663 deg
Mean motion:   13.15861166 rev/day
Decay rate:       4.50e-07 rev/day^2
Epoch rev:            3317

Satellite: MET-2/19
Catalog number: 20670
Epoch time:      90183.04636009
Element set:       7
Inclination:       82.5475 deg
RA of node:       276.8747 deg
Eccentricity:    0.0014659
Arg of perigee:   243.7424 deg
Mean anomaly:     116.2234 deg
Mean motion:   13.83835295 rev/day
Decay rate:      -5.00e-07 rev/day^2
Epoch rev:              57
/EX


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